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NEW SERIES. NEW HAVEN, CONN., DECEMBER, 1873. VOL. III., No. 12

THE DIFFICULTIES OF ENGLISH ORTHOGRAPHY.—No. II.

BY DR. EDWIN LEIGH, NEW YORK CITY.

The greatness and the true character of the difficulty of our orthography will be still further apparent if we take one *sound* of the letter *a* (the first or long sound for example), and observe in how many ways it is represented ; and, at the same time, the true and practical remedy will come to view.

Of the forty-seven combinations of *a*, twenty-one are at different times used to stand for this one sound. These are illustrated below, and side by side the words are printed in the "Pronouncing Orthography" * which is used in the schools of some of the chief cities of the United States (as New York, Boston, Washington, St. Louis, etc.), by means of which *one* sign is used in all these cases to denote this one long sound of *a*, and all this disorder is reduced to order ; the children have a sure guide to the right sound in every case, and learn better in half the time.

COMMON ORTHOGRAPHY.		PRONOUNCING ORTHOGRAPHY.	
a	in racing	a	in racing
aa	" Aaronic	aa	" Aaron'ic
ai	" pain	ai	" pain
aig	" campaign	aig	" campaign'
aigh	" straight	aigh	" straight
ao	" gaol	ao	" gaol
au	" gauging	au	" gauging
ay	" play	ay	" play
aye	" played	aye	" played
ayo	" mayor	ayo	" mayor
ae	" aerie	ae	" aer.e
ah	" dahlia	ah	" dahlia
ait	" trait	ait	" trait
alf	" halfpenny	alf	" halfpenny
ea	" great	ea	" great
a-e	" mate	a-e	" mate
ag-e	" champagne	ag-e	" champagne'
ai-e	" pained	ai-e	" pained
au-e	" gauged	au-e	" gauged
a-ue	" plague	a-ue	" plague
ar	" Carshalton	ar	" Carshal'ton

* Entered according to Act of Congress, in the year 1864, by EDWIN LEIGH, in the Clerk's Office of the U. S. District Court for the Eastern District of Missouri.

It will be seen how this one letter follows up all these twenty-one various combinations through all the thousands and thousands of words in which they occur, and everywhere guides the learner with certainty to the right sound (long *a*), brings order out of all this confusion, and opens a plain and sure path through all this labyrinth.

But we have further difficulties to overcome in the case of this first sound of *a ;* it is often represented by combinations in which the *letter a* does not occur. Of the eighty-five different combinations of *e*, twenty-three are sometimes used to stand for this sound of long *a ;* as follows :

COMMON ORTHOGRAPHY.		PRONOUNCING ORTHOGRAPHY.	
e	in debut	e	in debut'
e-e	" fete	e-e	" fete
ee	" toupee	ee	" toupee'
eh	" eh!	eh	" eh!
ei	" skein	ei	" skein
ei-e	" veiled	ei-e	" veiled
eig	" reign	eig	" reign
eig-e	" deigned	eig-e	" deigned
eigh	" eight	eigh	" eight
eighe	" weighed	eighe	" weighed
ey	" they	ey	" they
eye	" conveyed	eye	" conveyed'
eyo	" eyot	eyo	" eyot
ef	" chef-d'œuvre	ef	" chef-d'oeuvre'
er	" Cuvier	er	" Cuvier'
es	" Mes-dames	es	" Mes-dames
es-e	" Duchesne	es-e	" Duchesne'
et	" crochet	et	" crochet'
ez	" Nez Perce	ez	" Nez Perce
ue	" Fouque	ue	" Fouque'
ues	" Quesnel	ues	" Quesnel'
ues-e	" Duquesne	ues-e	" Duquesne'
uet	" bouquet	uet	" bouquet'

It is true that several of these words are derived from the French, some of them being proper names. But they are found in our standard American dictionaries, and, though strangers and immigrants, have become naturalized and found a home in our language, most of them being in very common use. The English language is made up of

such contributions from a great number and variety of tongues. It has a marvelous power of taking into itself and making its own, words from every source, preserving *more* or *less* of their forms and sounds. Like man—the highest of animals—it is omnivorous. This is a great source of the richness of its vocabulary, but this our wealth is our embarrassment. We have the thorns with the rose, as these tables illustrate.

It is worthy of note, however, that it is not the vowel combinations in the words derived from the Norman and French, and naturally bringing this power of *e* with them, that give us the greatest trouble. The most troublesome of these combinations, such as *ei* and *ey*, occur in words coming from British and Anglo-Saxon sources.

The object of this article would not be attained by omitting any of these forms. It is important to exhibit the full extent of this difficulty, and to show how effectually it is remedied for beginners, by a few simple phonetic signs regularly used, without destroying the orthographic forms.

In the case of these twenty-three combinations of *e* it is seen how a single phonetic form

ɐ

(made as much like an *a* as an *e* could easily be made), suffices to guide the learner through all these intricacies to the true sound—long *a*—in every word.

But, still further, 32 of the 85 combinations of *e* sometimes stand for long *e*. In all these 32

ɐ

cases, and in the thousands of words in which they occur, this one form of *e* is sufficient to represent with certainty and uniformity this one sound of long *e*.

So the 30 different combinations of *i* are used in

ɟ

98 different ways, and 17 of them sometimes stand for long *i*; but this one form suffices to determine this long sound in every instance.

The case is the same with the 41 combinations of *o*, used in 141 different ways — 28 of these

ɷ

stand sometimes for long *o*, and whenever this occurs, this one form suffices to guide the learner aright.

And, though there are forty combinations of *u*

ʜ

used in 121 different ways, and 20 of them sometimes stand for long *u* — this one form of the letter is a sure guide to it whenever it occurs.

But these various combinations are used almost as often, some of them oftener, for the *short* sounds of the five vowels. Whenever this occurs, one of these forms ă ĕ ĭ ŏ ŭ suffices to point out the fact.

They are also often *silent*; *e*, for example, being silent 250 times, where it stands for the long sound 180 times, or for the short sound 80 times. Whenever they thus denote *no* sound, the *hair line* types a e i o u suffice to denote this fact.

These few modified forms are much more easily learned than so many words; and when learned they serve to guide the learner, in every one of the hundreds of words he meets on every page, to exactly the right sound. They follow these lawless combinations of letters wherever they go, and reduce them to law and order.

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"Much time is saved in teaching to read by this method, and the children are better trained, and prepared for other instruction."—*Committee on Course of Studies, New York, November*, 1871.

"Gain in time, distinct articulation, better spelling—these are some of its merits. The gain in time is nearly one-half, and the improvement in quality is fully as great."—*Superintendent Harris, St. Louis; Report*, 1869–70.

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HISTORY OF PLAINFIELD ACADEMY. NO. VII.

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IN MEMORIAM.

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such contributions from a great number and variety of tongues. It has a marvelous power of taking into itself and making its own, words from every source, preserving *more* or *less* of their forms and sounds. Like man—the highest of animals—it is omnivorous. This is a great source of the richness of its vocabulary, but this our wealth is our embarrassment. We have the thorns with the rose, as these tables illustrate.

It is worthy of note, however, that it is not the vowel combinations in the words derived from the Norman and French, and naturally bringing this power of *e* with them, that give us the greatest trouble. The most troublesome of these combinations, such as *ei* and *ey*, occur in words coming from British and Anglo-Saxon sources.

The object of this article would not be attained by omitting any of these forms. It is important to exhibit the full extent of this difficulty, and to show how effectually it is remedied for beginners, by a few simple phonetic signs regularly used, without destroying the orthographic forms.

In the case of these twenty-three combinations of *e* it is seen how a single phonetic form

(made as much like an *a* as an *e* could easily be made), suffices to guide the learner through all these intricacies to the true sound—long *a*—in every word.

But, still further, 32 of the 85 combinations of *e* sometimes stand for long *e*. In all these 32

cases, and in the thousands of words in which they occur, this one form of *e* is sufficient to represent with certainty and uniformity this one sound of long *e*.

So the 30 different combinations of *i* are used in

98 different ways, and 17 of them sometimes stand for long *i*; but this one form suffices to determine this long sound in every instance.

The case is the same with the 41 combinations of *o*, used in 141 different ways — 28 of these

stand sometimes for long *o*, and whenever this occurs, this one form suffices to guide the learner aright.

And, though there are forty combinations of *u* used in 121 different ways, and 20 of them

sometimes stand for long *u* — this one form of the letter is a sure guide to it whenever it occurs.

But these various combinations are used almost as often, some of them oftener, for the *short* sounds of the five vowels. Whenever this occurs, one of these forms suffices to point out the fact.

They are also often *silent*; *e*, for example, being silent 250 times, where it stands for the long sound 180 times, or for the short sound 80 times. Whenever they thus denote *no* sound, the *hair line* types suffice to denote this fact.

These few modified forms are much more easily learned than so many words; and when learned they serve to guide the learner, in every one of the hundreds of words he meets on every page, to exactly the right sound. They follow these lawless combinations of letters wherever they go, and reduce them to law and order.

No wonder, then, that School Committees and Superintendents, after years of thorough trial in their schools, say:*

"It is a moderate statement that every pupil instructed under this new method saves a year or more of time in preparing for the grammar school."—*Boston School Committee; Report*, 1869.

"Its success has been so decided that it seems desirable that it should be made obligatory in all the districts."—*Superintendent Philbrick, Boston; Report*, 1872.

"Full one-half the time required in learning to read by the old method, is saved to the pupil by following this plan."—*Superintendent Bryant, Burlington, Iowa; Report*, 1872.

"The pupils not only learning to read in a shorter time, but to read more distinctly and fluently; and what is even more important, making the acquirement in a thoughtful and logical manner."—*Superintendent Kiddle, New York; Report*, 1870.

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MALVIN HOWLAND enlisted in a Massachusetts Regiment and died at Point of Rocks.

WILLIAM H. AMES died at New York of disease, on his way home from the field of battle, after discharge for physical inability.

CHARLES NEWTON was discharged on Roanoke Island, sick, and soon died.

WILLIAM PICKET and BENJAMIN STARKWEATHER were killed May 16, 1864, at Drury's Bluff.

WILLIAM EMBRER enlisted in a New York Regiment, and was killed at Antietam.

WALTER F. STANDISH fell in the terrible conflict at Gettysburg.

GEORGE COGSWELL was severely wounded in the thigh at Snicker's Ford, July 18, 1863. He was taken to Sandy Hook Hospital, and then to the National Hospital, Camden street, Baltimore, where he remained till November, when (by order of Secretary Stanton of the War Department) he was taken home to Plainfield, he still remaining a member of his regiment at the close of the war. His health never recovered its former tone, and after lingering for many months, he finally died of disease contracted amid the hardships of the battle-field, December 2, 1868.

Doubtless there are others of Mr. Burleigh's pupils who fell in the bloody, patriotic struggle to save the nation's imperiled life. Some sleep in far distant and unmarked Southern graves; others rest beneath the sentinel tablets in the sacred home-burying ground. In the freshness of early youth they poured out their lives an offering on the altar of their country; nor shall their patriotic devotion be forgotten, or ever cease to inspire the young men of our land to do and dare, and if need be, die like them.

After closing his principalship Mr. Burleigh took charge of the Central Village High School, where he remained nearly two years, instructing a most interesting class of pupils, several of whom already occupy enviable positions in life. During the last four years of his labors as an instructor, Mr. Burleigh was supplying a pulpit on the Sabbath. The duties of the ministry absorbing a large share of his time and energies, he relinquished teaching, received ordination, and became pastor of the church of Ashford, South Centre. In the fall of 1867 he resigned the pastorate, and accepted an agency for the Connecticut Temperance Union, in which he has continued to labor a portion of each year since. In the discharge of the duties of his agency he has become known in every town in the State. He has not lost his interest in education, either in the public or high schools, and loses no opportunity to inform himself in all matters pertaining to the progress of educational improvement; fully believing that the future welfare of our nation will be most effectually promoted by making education as complete and universal as possible, and by seeking the highest moral elevation of the people; that schools and academies are cheaper than dram-shops, and that when right education has accomplished its benign mission there will be small demand for prisons and penitentiaries.

In the fall of 1859 Mr. H. H. Jencks, then residing at Providence, R. I., was chosen Principal of the Academy. He immediately made very grand announcements of enlarged and greatly improved facilities for instruction in the classics, music, drawing, and the fine arts. Several assistants were advertised, and with unusual and, as the result proved, unwarrantable flourish of trumpets the school was re-opened. Expectation ran high, but was destined to a grand collapse. The scores and hundreds of pupils who were needed to fill out the magnificent proportions of the stilted prospectus failed to respond. There was rather a mortifying dearth of of scholars, and in a few days the Principal disappeared without waiting to tender a formal resignation, leaving his chief assistant to carry on the school as best he might.

The gentleman thus unceremoniously left in charge was Rev. William Colgrove, a fair teacher and respectable scholar, especially in chemistry and natural science. In the absence of the Principal-elect, Mr. Colgrove performed the duties of that office, received the tuition of pupils, and, by a special vote of the trustees, the avails of the Coit Legacy. On the 17th of April, 1860, the trustees voted that the nominal Principalship of H. H. Jencks should close with the end of the spring term; they also voted to close the building during the summer for general repairs in progress till the coming winter. In 1861, Mr. George C. Tingly was elected principal, and remained in charge till the summer of 1863. Pupils were not numerous and after an unprofitable season of nearly two years he resigned, considerably out of pocket, and with no small disgust at his undeserved ill-success. He was really an excellent teacher and an accomplished scholar, as has been proved by his subsequent success in Brooklyn as a teacher, and as a civil engineer in Providence, R. I.

It would be a difficult task to disclose the varied causes that conspired to place this old institution temporarily under a cloud, as it had seemingly

been since the advent of Mr. Jencks, and the rewardless undertaking will not be attempted. It is due to both Mr. Colgrove and Mr. Tingly to say that they deserved a better success than was accorded to them, and even Mr. Jencks, who has been successful in other callings, might, in another field and under favoring circumstances, have won better fame.

In the fall of 1863, Mr. A. F. Haradon, of Wesleyan University, at Middletown, became Principal, and taught, with but slender results, for two and a half terms. In 1864 another teacher, whose name does not appear on the records of the trustees—it is thought to have been Clark—for lack of pupils remained in the office of Principal for only a part of a term. Instruction was then suspended until the summer of 1870, when it was deemed expedient to place the institution in the hands of a thoroughly educated lady. The teacher chosen was Miss M. E. Sawyer, of Ashburnham, Mass., a graduate of Mount Holyoke Female Seminary. Her skillful instructions did much to restore to its former luster the fame of the academy. She brought to her responsible position accurate scholarship, skill and zeal in imparting instruction, and an unfaltering energy in discharging her duties. She did a noble work, and left her imprint on the minds of her pupils, who will bear with them marks of her patient devotion in all their future intellectual manifestations. She remained but a year. Her spring term in 1871 closed with a delightful exhibition, which will be long remembered. Prostrated by a severe fit of sickness, she was unable to resume her duties in the fall, and she has, at least for the time, relinquished her chosen and cherished profession. As it was hoped her absence would be but temporary, Rev. Wm. H. Phipps, at considerable inconvenience, taught through the term, acting at the same time as stated supply to the Congregational pulpit at East Woodstock. Miss Sawyer and Mr. Phipps were both assisted by Miss Marion Phipps, formerly of Paxton, Mass., now of Plainfield. At the opening of the winter term of 1871–2, Miss Laura S. Watson, of Sedgwick, Me., was chosen Principal. Her preparatory studies were passed at Hebron Academy, Me., and she graduated at Mount Holyoke, July 6, 1871. After teaching in Brooklyn, N. Y., and in Franklyn, Mass., she entered upon her duties at Plainfield in November, 1871. A scarcity of pupils constrained her to resign her position in June, 1873. Her success was not equal to that of her predecessor, yet she is remembered kindly by most of her pupils, Instruction was not immediately resumed, but in August 27, 1873, Miss Helen M. Metcalf, of Franklyn, Mass., entered upon the duties of Principal, and has just closed a prosperous and successful term. She was born in Framingham, Mass., studied at Dean Academy, in Franklyn, and graduated at Mount Holyoke Seminary in 1873. She has formerly had some experience as a teacher both in Franklyn and in Walpole. In the Academy she has been assisted by Mrs. Theresa Reed and Miss Abbey Van Ness; the former a teacher of much experience, and the latter a graduate of Holyoke Seminary in the class of 1873.

The time that has elapsed since Mr. Jencks assumed the chair of Principal has been too short to warrant our saying much of the present or prospective eminence of the later pupils. Suffice it to say that several of them are pursuing collegiate studies or have already graduated, and some are gaining distinction as professional teachers, or in practical business.

For nearly a century this honored institution has held a high place among the academies of our State, and may yet have a distinguished future. Its past influence cannot be measured. Thousands of pupils have gone forth from its walls to the duties of life, with rich stores of knowledge and a large measure of culture and mental discipline, which have added not a little to their efficiency in business and affairs. To secure an increased power for good will demand more liberal endowment, and more generous outlay of funds in the erection of a suitable boarding-house, the purchase of maps, and chemical, philosophical, and astronomical apparatus. The want of an adequate endowment is now, as it has been from the first, the grand difficulty in the way of ultimate success. Various expedients have been proposed in past years to remedy in some degree this deficiency. In 1810 and again in 1825 the trustees appointed a committee to petition the Legislature of the State to grant a lottery in aid of the Academy. It is not known with certainty that such a petition was ever actually presented, but for the honor of the institution it is fortunate that no such grant was ever made. In 1833 the trustees voted to require an entrance fee of one dollar from each pupil. In 1845 a small charge for incidental expenses was substituted for entrance money; but the practice of paying entrance fees continued nearly if not quite to the present time. The fund from this source has never been adequate to the cost of needed repairs. In the absence of other means of sustaining the Academy the trus-

tees have contributed from time to time of their own resources, and have probably felt a deeper interest in the institution from the fact that it has cost them not a little to keep it in running condition. The Coit Legacy, though small, has yet been very useful in aiding to sustain the Academy in those seasons when it was in the wane, and restoring it to its already prosperous condition. Previous to the chartering of the Academy only six persons from Plainfield are known to have graduated at college, and all of them claimed Yale as their *Alma Mater:*

Rev. Cyrus Marsh,	1739
John Shepard,	1748
Rev. Josiah Whitney,	1752
Benjamin Douglass,	1760
John Pierce,	1777
Rev. Josiah Spalding,	1778

Since the academy went into operation the number of graduates belonging to Plainfield, as far as known, has been 33, which were matriculated as follows: at Dartmouth, 7; Brown, 6; Oberlin, 2; Amherst, 4; Yale, 7; Union, 1; Hamilton, 1; Trinity, 1; Bowdoin, 1; Wesleyan University, 1; West Point, 2; 1, unknown. Several others have graduated at business colleges, technic institutes, and commercial schools.

When it is remembered that the population of Plainfield, at the time the Academy was established, was only fifteen hundred, and that it increased but little for thirty or forty years after, the number of college graduates will appear quite respectable—doubtless considerably larger than it would have been had there been no such institution in the place to foster learning, and call out and quicken youthful ambition for knowledge. A much greater number of the youth of Plainfield have received their *principal* or *entire* education at the Academy, and have gone forth to fill useful and important stations in society.

Of the more extended and diffused influence of the Academy, in promoting the educational and other valuable interests of the community, some opinion may be formed from an estimate of the thousands of pupils who for the past, almost, a century, have gone forth to the practical pursuits of life over all the land and world; many of whom have faithfully served their God and their generation, and been distinguished lights in the world.

Here our record must rest. Errors have doubtless crept into our work. We cannot presume on more than an approximation to accuracy; but some future collater of facts may gain some help from our accumulations, and by some new and wider inquiries, may correct any faults of facts or statement discoverable in what is here written. Venerable institution! may you continue to shine till all the world is irradiated with the effulgence of knowledge, and the more glorious illumination of the Sun of Righteousness!

METHOD OF TEACHING LANGUAGE.*

BY ALFRED S. HALL, A.B., NASHUA, N. H.

My suggestions will be of a practical nature, and, if they have any worth, will be chiefly valuable to the teachers of our common schools. I am not now to express any preference for either the English method of pronouncing Latin, or the Continental, nor am I to discuss the teachings of Erasmus in any way.

But thus restricting our subject to its teaching in the common schools, let us by no means undervalue it. Language, which lies at the foundation of all our knowledge. Language, the gift which most indisputably of all marks our preeminence in the innumerable caravan of beings. Language, of all man's instruments the most wonderful; that upon which depends his whole national existence. It is thought, they tell us, that rules the world. But language is to thought what the sun is to the day. Deprive us of this medium of thought, and thought itself has ceased all its aggression. Have we not, then, a theme worthy of our careful study and thoughtful teaching?

How it was first placed in the mouth of man, who shall tell us? Men have their theories, theories their plausibilities. But certainty is as impossible as in telling whence comes the undying soul within us. So let us take it as it is. And what branch is there which we, as faithful teachers of the common schools, teach so poorly? I believe there is not another. And I am told that prominent among the essential particulars in which our schools are inferior to the best in Europe, are our methods of teaching language. The almost universal inaccuracy in the use of language is ample evidence of defect in its teaching. Men are mortified to the quick at an error in computation, but nobody expects perfection in language. Business men write their scores of letters daily in which half the sentences may be well criticised, but let a single error in arithmetical calculations appear, and the reputation of the man

* From an Address before the New Hampshire State Teachers' Association.

is undone. Why this distinction? Why blush for an error in figures which are used only occasionally, and not for one in language whose use is constant in the mouth of all men?

What we want, then, is a study of language that shall be begun in childhood and continued until old age. Our method should be such as to lead the scholar once interested, to that unremittant care in the use of language, and that cultivated taste in its study and appreciation, which shall in the end make his expression at once forcible, elegant, and correct. And I believe such a method is possible. Such habits of investigation may be formed in the common school, that the scholar will always strive for greater excellence in his own use of language and for full ability to understand that of others. We are only to attempt to start him upon the right course. But there is no more reason for the scholar to consider his study of this branch as completed when he leaves the school, even of the highest grade, than to hold the further use of the muscles unnecessary when a well-developed physique has been secured.

The teaching should commence, then, long before the dull, dry book, from which the scholars of fifty years ago drew all their ideas of language, can be intelligently introduced. There is an instruction outside this book; and he who makes his instruction in language, only an instruction in grammar, fails. His are the scholars who invariably declare the whole study irksome, hated, useless. Commence with the primaries, and obtain so far as possible with them a proper use of language. Let this be the first object, and its pursuit long continued.

So it is in every branch of learning properly approached. First the use, then the science; first the practical art, then the theory. Commencing with the science, confusion is the most natural, dislike the most general consequence. What common sense is there in attempting the classification of knowledge, which constitutes the science, when there are no materials possessed to be classified?

I say, then, commence the teaching of language with children, leaving the use of the grammar until an age of understanding is reached. And, were I to appoint that age, I should say the average scholar is not disadvantaged if he does not see the grammar until the age of thirteen or fourteen. But for years before, the teacher should seek a correctness in his expression. See that he uses proper terms for his thought. Wake up the whole class in the correction of the sentences of one another. Give them sentences to correct; and of these the ingenious teacher will find no lack. The air is full of them. In simple manner, show them wherein correction lies. Teach them to make their sentences complete. Break up the country habit of expressing half thoughts in half sentences. Teach them how to talk, and give a pleasure to all their labor. Then with a careful moderation, extend the diction of the child. Have him express the same thought in different ways and in different terms, and give him abundant and varied exercise of this kind. Cultivate their power of language by giving all the exercise possible in its careful use, letting them have due time for each particular of the work.

At an early age, too, writing should be introduced, and its attendant accuracy secured. Not the writing of their own thoughts at first, for that is often the hardest effort of experienced men, but something of another's first, and afterward gradually incorporate their own thought. The writing of some part of the lesson in any study will subserve a double purpose. Let one correct another's paper, and perhaps an interest may be taken in writing out their criticism. Study to give the young mind variety of employment, and for all your pains-taking their enthusiasm and progress shall be a grateful reward. And with all this striving for correctness, the teacher should be just as active in pointing out the excellences for composition, as its defects. Dwell upon the perfections of language; such a criticism is as valuable as any. As much enthusiasm can be awakened in disclosing the beauties of fine expression as in searching out defects.

Perhaps it need not be added that in all teaching, success will much depend upon the study of the scholar by the teacher. Mind cannot be expanded, unless understood. We may have general methods, but these must be made to conform in a measure to the capacity of the scholar. The same subject may seem exceedingly distasteful to one scholar and most pleasing to another; and yet had it been presented in a manner to meet the different peculiarities of temperament, the subject matter might be equally well received.

To the use of the grammar itself in its proper season, I would not be understood as standing opposed. The text-book has its place in all sciences. In the hands of a discreet teacher it is a powerful instrument in securing industry, self-help upon the part of the scholar, precision, and meditative attention. We are not to reject it because it is old. The excellence of old methods should be retained, and to it must be added the deductions and unfoldings of the present. For the mastery of those principles which underlie all faultless expression, and without

which the true scholar will not be content, we need the grammar. But the scholar should understand that the grammar was made from the language, and not the language from the grammar; nor should he look to find everything in the language accounted for in the grammar; he must not reject all that is not there explained. Let the teacher acquaint the pupil with the idioms of language, and teach him that he will do well to accept them merely as such. He must qualify all the work, and lead the scholar to do the same. Bring his own judgment and discrimination to bear, not attempting to form this judgement for him, but secure the exercise of that which he has.

When the grammar is most used, the ability to parse every word after a form, which certainly has its advantage in securing system, is not to be considered the highest accomplishment. There is an analysis, not necessary formal, far more important; an analysis which separates the sentence into its component elements, points out the force and relation of each, dwells upon the choice of words, unfolds the nature of the whole expression and the bearing of all the parts. Bring common sense to bear upon the language quite as much as the formal verbiage of syntax; unite them.

I may have indicated a good deal of work for the teachers of common schools; but there is abundant time. The teacher must never feel hurried, and must be extremely careful never to attempt too much. Until one topic is completed, another should not be begun. It will not do to treat of the noun to-day, the verb to-morrow, and the next day the pronoun, but master fully one subject at a time, frequently reviewing the past. What has been communicated to the scholar, he should tell back to the teacher in turn; thus are the ends of discipline secured. There must be animation in the recitation, not less marked than that in the class in mental arithmetic. And for it all, we must look mainly to the teacher. If he determines upon thoroughness, variety and fidelity in his drill, and earnestness and animation on his own part, he may confidently expect his scholars to be enthusiastic in the recitation, and then, and only then, in the study.

Rev. Dr. Littledale, of England, puts down the ministers of the Established Church of England at 20,000. Of these, he says, 2,000 belong to the Broad-church party, 3,000 to what he calls the Colorless or Nondescript, 5,000 to the Low-church, and 10,000 to the various attitudes of the High-church party.

Young Teachers' Department.

EVENINGS WITH THE STARS.—No. IX.

BY W. B. DWIGHT, NEW BRITAIN.

One of the grandest exhibitions of star scenery is witnessed in the eastern half of the sky during the latter hours of a December evening. You may fairly revel in the glittering beauties, so exquisitely grouped, and though but a beginner in star study, you may tell off with the utmost ease the well-marked clusters that combine to make this glorious scene. In the Zodiacal belt, the imposing form of Taurus looms up overhead, with Aldebaran sparkling on its brow; its horns, each tipped with a star, are making a mighty thrust at the lovely Gemini, who seem ever serenely unconscious of the coming assault. Above these Auriga and Perseus guard the portals of the North. To the South of the Zodiac lie the group which, by their surpassing splendor, perfect the scene. First in conspicuousness, and and doubtless in all the visible heavens for beauty, is Orion. Even Scorpio, the great glory of the midsummer sky, must yield the palm to Orion as it displays its royal set of brilliants high up in the winter firmament. Then, in close companionship, shines forth in loveliness barely excelled by Orion, the exquisite cluster of Canis Major, made resplendent by the superb orb of Sirius, to which our own sun, though it be a million and a quarter times this little foot-ball of our globe, seems but a plaything in comparison. Canis Minor, embodied chiefly in the great Procyon, which closely resembles Sirius in its splendor, stands in the gap between Canis Major and Cancer. The lesser groups, the crouching Hare, the gently flowing River Po, Noah's Dove, the Ship Argo, and the phantom Unicorn, fill out the picture.

To point out these groups is an easy task. Orion is chiefly a large parallelogram, marked exactly in its center by three brilliant stars, closely set in a straight line parallel with the shorter side of the parallelogram. These three stars form the sword-belt, and the sword is plainly identified in a somewhat fainter line stretching southward and forming an acute angle with the line of the belt. Two angles of the parallelogram, diagonally opposite, are five first magnitudes; Betelguese, the most northerly, marks the right shoulder, and Rigel, the southerly one, marks the left foot. In the left shoulder is the second magnitude Bellatrix, and in the right knee the third magnitude Saiph. A curved line of

small stars, stretching from the head of Taurus to the belt of Orion, mark the head of the lion held up in Orion's hand. Other details of the figure are now readily made out from the chart. From the left foot near Rigel, flows out a long line of stars, westerly towards Cetus, and then turns south in a large bend. This is the River Po. Close to Orion, directly south, is a neat little arc of stars bending in upon itself so as to form a quadrangle at the lower part. This is Lepus, the Hare. Just east of Lepus is the unmistakable group of Canis Major, the Greater Dog. The head is located by Sirius, generally considered the brightest in the starry system. Several companions of Sirius, and three or four sparkling clusters below it, constitute the whole figure, which stands manifestly apart from all other stars in an oblong, stretching due north and south about 35°.

Northeast of Sirius, and forming with it and Betelguese in Orion a large equilateral triangle is Procyon, the essential part of Canis Minor, the Lesser Dog. A straight line drawn from Procyon to Sirius and carried as far beyond, touches Phad, a second magnitude, locating the group of Columba Noachi (Noah's Dove). Another straight line from Betelguese through Sirius, to an equal distance beyond, touches Naos, another second magnitude, which, with a large number of attendant stars, forms Argo Navis (the Ship Argo). We have, then, as a landmark—or rather star-mark to be remembered, a huge X formed by the five stars Procyon, Betelguese, Sirius, Naos, and Phad.

Due east of Procyon, and near by, note the diamond forming the head of Hydra (the Water-Snake).

With a hasty glance at a few minor groups which it was not convenient to notice when we were in their vicinity, we may conclude our survey of the winter heavens. Due north of Gemini and close to Castor, is a very insignificant collection called Herschell's Telescope. A few widely scattered stars between Canis Major and Canis Minor, and stretching from near Hydra's head to Orion, form in very uncertain outline, phantom-like, the Monoceros or Unicorn. Due north of the square of Pegasus, are two very small groups: the eastern one is Gloria Frederica; the western is Lacerta (the Lizard).

Three constellations now to be described, are best seen in the fall. Fomalhaut has been already located as the only first magnitude lying south of Aquarius, and seen in the southern heavens. A horizontal line of small stars is quite conspicuous ust below it, stretching west; this chiefly depicts Pisces Australis, the Southern Fish. From the western end of this line another similar one extends at an acute angle to the southeast. This locates Grus (the Crane). Low in the horizon to the east of Grus, may be seen a second magnitude, forming with Fomalhaut, and the nearest second magnitude of Cetus, a nearly equilateral triangle. This newly found star is the chief one in the Phœnix, forming its neck, while the uplifted wings stretch to the right and left in lesser magnitudes.

The study of the northern constellations having come to a conclusion, it only remains to say a few words in regard to instructions as to the greater circles recognized in astronography.

First as to the equator. Let the class understand clearly that if they were standing on the earth's equator, the celestial equator would be directly overhead, and the celestial pole exactly in the northern horizon. If they walk one degree north, the celestial equator will now pass one degree south of the zenith, while the pole has risen correspondingly one degree above the northern horizon. If they come north 42°, or about our latitude, the celestial equator from their new position will pass where we see it, 42° south of the zenith, and the North Star will be 42° above the horizon. Let the class verify this by actual examination of the heavens. This will determine the highest point of the equator. To determine its complete circuit, the class class bear in mind that every point 90° from this North Star is in the equator. Its circuit may be practically and readily ascertained in a rough but useful way, by means of two light rods attached together at right angles. Keep one rod steadily pointed at the North Star while revolving it. The other will trace out the position of the equinoctial to any one sighting along the moving rod.

The confusion caused to many by the varrying positions of the zodiacal belt can be removed by a little careful consideration of its relations to the equator. From its oblique position it must have two points of intersection with the equator (equinoxes), and two points of greatest distance $23\frac{1}{2}°$ from the equator (solstices), and one half of it must always be to the north, and the other to the south of the equator. Recall the fact that the sun runs low in winter and high in summer; now as the night shows the part of the heavens *opposite* the sun, of course we shall see the parts of the zodiac which are *low*, in the summer, and *high* in the winter. After this is well understood, let the class actually trace out at different seasons, the relative positions of the equinoctial and ecliptic (or zodiacal) circles, noting in

the stars the solstitial and equinoctial points then visible. For instance, at the summer solstice, (June 21), of course the sun sets on the solstitial point, (sign Cancer, constellation Gemini); at the same time the other solstice (sign Capricornus, constellation Sagittarius) will be just rising in the eastern horizon. One equinoctial point (the autumnal, sign Libra, constellation Virgo), will be exactly on the meridian. At 9 o'clock P.M., the summer solstice will be one hour and twenty minutes (in our latitude) below the horizon, the winter solstice (in Sagittarius), in full sight, the same distance above our eastern horizon, and the autumnal equinox (in Virgo) will be in the southeastern sky. Note these points, and observe that the larger part of the ecliptic and zodiac are below the celestial equator. On September 23d the equinoxes are on the horizon at the same time with the sun, and the winter solstice is on the meridian, $23\frac{1}{2}°$ south of the equator. At this moment the entire zodiac runs very low. Bring out these and other positions boldly, and it will clear away much confusion.

The Colures may be pointed out as follows, taking for example the same periods of observation as with the constellations. In June, the Equinoctial colure may be traced from Polaris on the one side through Caph, the most western star of Cassiopeia, and on the other side, through Megrez of Ursa Major, (junction of the handle with the Dipper), then through the head of Virgo, and through Corvus. The solstitial colure may be traced from Polaris in one direction passing 30° east of Menkalina; in the opposite direction passing just west of Draco's head, through Cerberus, Bull of Poniatowskia and the Bow of Sagittarius. In December, the Equinoctial Colure may be further traced through Alpheratz (head of Andromeda), Algenib (S.E. corner of square of Pegasus), and the tail of Cetus; the solstitial colure, through the western extreme of Gemini and slightly to the east of Betelguese of Orion, and the constellation Lepus.

Our suggestions on astronomical instruction may here properly be brought to a close.

TOURS OF OBSERVATION AMONG THE SCHOOLS.—No. VII.

BY A. PARISH, SUPT. SCHOOLS, NEW HAVEN.

"Since our last interview I have visited several schools alone, as you advised me to do; and I have learned many things which made my visits both pleasant and profitable.

"You have doubtless seen many *methods*, as practiced by the teachers, but have you learned any *principle*, as developed by their methods? For you must remember that one may observe the operations of a school, as mere mechanical movements, and gain very little advantage from all the observations one could make in a twelvemonth. Now, if you please, tell me what you have learned that will be really valuable to carry into practice when you begin to teach."

"Well, if I could secure such precision in all the movements of my school as those I have seen, I should be sure of *good order* at least. But, to answer your request, it seemed to me that the general management of the school aimed to teach, as a prime object,

The Lesson of Carefulness.

And as I have seen the importance of it illustrated by practice and precept among the children, in every exercise required, allow me to say that, in my opinion, this is the essential, indispensable lesson to be taught and practiced by both teacher and pupil."

"Indeed, you do not mean to increase the multitude of branches already required to be taught; to add a new lesson to be memorized from some text book and repeated verbatim by the children!"

"By no means; we have too much teaching of that sort already. 'The lesson of carefulness' is less of words than of actions; and the beauty of it is, that it may, it *must* be ever present with each individual, entering into every thought and action, as an integral element, not hindering effort, but inspiring, guiding the mind to desirable results."

"I see you have been employing your observation to some purpose. You have gained an *idea* that will be valuable, if a practical use can be made of it. I shall be gratified if you will give me some illustrations of what you have seen."

"Do you remember a remark you made to me about a certain teacher, of whom you often speak approvingly, that 'her school always went like clock-work'? I have discovered the secret of her success, I think. It was more than half an hour before 9 o'clock, when I entered the school room; for I wished to be present to witness the gathering of the children, and observe their conduct while assembling. The real spirit of pupils and the control a teacher has over them can be learned, it seems to me, quite as well from their conduct when left apparently uncontrolled, as when immediately under the teacher's eye they are required to sit or move with great precision.

"Entering the school room I found Miss B. al-

ready very busy, preparing for her day's work. You begin your duties quite early, I remarked, Do you find it necessary to do school work before the usual school time?"

"Yes, there are many things which need attention beforehand to prevent the necessity of neglecting the exercises of the classes during school time. I do not wish to lose a moment of time, nor have my attention diverted for an instant from my duties, or the employment of the children, after the opening of the school, to the close of the session. So I come here to examine the premises, to see that everything is right in the school-yard, dress-room and school-room. Sometimes the room has not been properly swept and dusted. Perhaps a window may have been left open, or the fire may not have been properly cared for, so that the temperature of the room needs attention. I find that children need, first of all, to be *happy*—that is, free from all discomforts of body as well as disturbing thoughts, in order to be easily controlled or instructed. A chilly atmosphere always makes my pupils uneasy and irritable, they are unfitted, both bodily and mentally, to give attention, to be interested, or to be obedient. Also if the room is too warm, they become stupid and incapable of mental activity. And if the floor is dirty and the desks are covered with dust or papers and litter, I find that the children quickly get careless, grow slovenly, lose their ambition to be orderly; and so easily is a child's mind affected, that a 'don't care' spirit is created, or begins to grow from such apparently trifling causes. As the children gather on the school grounds, I think it well to observe their spirit toward each other, for they thus indicate the temper that will probably appear during the day. The boy who shows a quarrelsome or trickish disposition among his mates, will need a watchful eye after he enters the school-room.

"I take this time, too, to glance at the condition of the children's desks; to see if their books are kept in good order, to notice whether there are scratches, cuts, or damage of any kind. Many exercises connected with the lessons I place on the blackboard, at this time, to avoid interruption in school hours."

"These are only a few of the things this teacher named for which she thought it necessary to begin *her* work so early. I quickly discovered that she acted on the principle that '*prevention is better than cure.*' Her mind seemed to be quite as intent on making thorough *preparation* for the regular duties of the school, as in following out the programme of exercises during the day. Indeed, she remarked to me, that the old adage, '*A thing well begun is half done,*' had been proved true in her experience. The multitude of little devices which she had continued to throw into the exercises to create and sustain interest, proved that her whole heart was in her work; and it was very evident that the '*lesson of carefulness*' is as profitable for the teacher as for the scholars.

"I have not been able to tell you half of what I observed in the mere *preparation* of this teacher for her day's work, and you see I have said nothing about the exercises of the school during the day."

"But you have given me a very interesting account of your observation; and I think you make it quite clear that the cultivation and practice of *carefulness* is quite important for the teacher, and I hope you will be able to show me next, how the children were taught the '*lesson of carefulness.*'"

MISCELLANY.

THOUGHTS ON ARITHMETIC.

BY ALONZO JACKMAN,
Professor of Mathematics in Norwich University.

1. The characteristic or Key to our system of Arithmetic is *ten*. To show the truth of this, we need only apply the *Law* of Notation to our *Scale* of Numeration, thus:

For a *Representative Scale*, conceive in the mind an indefinite row of digits, arranged to express some number: then, by the Law of Notation, should any digit in that row be moved a *given number* of places toward the left, its value would thereby be increased to a degree equivalent to multiplying it by that value of ten whose power is the *given number*. Accordingly, to begin at unit's place, and read this *scale* in order from right to left, the successive *names* of digit-places would be *units*, *tens*, *hundreds*, thousands, *ten-thousands*, *hundred-thousands*, millions, and so on, as shown in works on arithmetic.

2. For many years the learned gave to the Arabs the honor of inventing arithmetic, but recent discoveries seem to show that the Chinese were acquainted with the system, possibly long before an Arab existed. Now, how is it that all nations and tribes throughout historic time should make the number *ten* the key to their numerical computation? Even the chronology recorded by Moses in the first part of Genesis, makes it quite probable that the ante-diluvians understood well our system of arithmetic.

3. Our arithmetic consists of *three distinct Orders* of numerical series combined into ONE COMPLETE ORDER.

And these three orders are so related to each other that the second cannot exist without the first; nor can the third without the second. Further, each order has, for its successive terms, appropriate names, thus forming an exact language by which to communicate numerical intelligence.

4. The *First* of the three orders is an *Increasing Series*, having a *unit* difference between each two consecutive terms.

The *Second* and *Third* Orders are each formed by taking some number for the First Term whose successive *integer-powers* develop the succeeding terms of the Order: Each power being the number of its developed term. Bear in mind that the zero power of any number is equal to a unit.

5. The First Order of Series consists of the well-known numbers, *one, two, three, four*, five, and so on, indefinitely; and their representative digits are 1, 2, 3, 4, 5, 6, 7, 8, 9. More than these nine digits would be superfluous; since, on the Scale of Numeration (1) ten units for any place may be denoted by one unit in the place next on the left. However, the character 0, called the *cipher*, is used to prevent the loss of places on the scale, should they become vacant for the want of suitable values to occupy them.

6. The Second Order of Series has for its first term *ten*, or 10; and, according to (5), the succeeding terms of the order, when *numbered* and *named*, are as follows: The 1st term, $10^1 = 10$, named *ten;* 2d, $10^2 = 100$, a *hundred;* 3d, $10^3 = 1000$, a thousand; 4th, $10^4 = 10000$ *ten thousand;* 5th, $10^5 = 100000$, a *hundred thousand;* 6th, $10^6 = 1000000$, *a million;* and so on; also, $10^0 = 1$.

By comparing these several terms with their equivalent values on the Scale of Numeration (1), we find the two sets perfectly coincide, both as to name and place.

7. The Third Order of Series has, for its first term, a *Million*. Now, concerning the term *million*, it is established in the English language beyond controversy:

1st. That its numerical value is equal to 100000; and 2d, that it is the first term of a numerical series, the names of whose succeeding terms are *Billion, Trillion, Quadrillion*, Pentillion, and so on. In fact, the composition of those names alone amounts almost to a demonstration of their intended use. It hence follows, according to (5), that the succeeding terms of this order, when numbered and named, are thus: 1st term, $(1000000)^1 = 1000000$, a *million;* 2d, $(1000000)^2 = 1000000000000$, a *billion;* 3d, $(1000000^3 = 1000000,000000,000000$, a *trillion;* 4th, $(1000000)^4$, a *quadrillion;* 5th, $(1000000)^5$, a *quintillion*, and so on; also, $(1000000^0 = 1$.

8. By comparing the above values, (7) with the Scale of Numeration, beginning at unit's place, we see that the unit-place for Millions is the seventh place on the scale; the unit-place for Billions, the thirteenth; the unit-place for Trillions, the nineteenth; and so on. Whence it is plain, that if the Scale of Numeration be separated into periods of six places each, beginning at unit's place, the first place of each period will be a *unit-place;* and these *places*, in the order of their periods from right to left, are specified thus: The unit-place for *units*: the unit-place for *millions;* the unit-place for *billions*, and so on. Hence, the first period is the unit-period; the second, the million-period; the third, the billion-period, and so on.

9. When the three Orders (3) are taken as a whole, according to the Scale of Numeration (1) each digit-value from one to ten is comprehended by the First Order; each period-value, from one to a *million*, by the Second Order; and the Third Order opens out sufficiently to occupy the power of any human intellect. Here, then, we have *a perfect scientific system of numeration*, equal to all the wants of man. And this is the well-known "English method."

10. Did circumstances require it, an Order of Series could be formed, according to (4), by taking a thousand or 1000 for the first term; but we have no names for the several terms. If, however, we give 1000, its true name "mille," and to this name join the *numerical prefixes*, as was done in forming the Third Order of names (7), we have a set of names seemingly appropriate. Accordingly, the terms of this extra Order, when numbered and named, will be as follows: 1st term, $(1000)^1 = 1000$, a *mille;* 2d, $(1000)^2 = 1000000$, a *bille;* 3d, $(1000)^3 = 1000000000$, a *trille;* 4th, $(1000)^4 = 1000000000000$, a *quadrille;* 5th $(1000)^5$, a *quintille;* and so on. But, to suit these values to the Scale of Numeration (1), that scale must be separated into periods of three places each. Hence it will take twice as many of these short periods as of the English periods (9) to make equivalent values; since $(1000000)^n = (1000)^{2n}$.

11. *Query.*—Would arithmetical operations be improved by introducing the method of numerating by *short periods* (10)? In examining this point it becomes evident—1st. That a vast majority of the people would never so much as discover the new introduction, since only a very small percentage of their business transactions would cause the numerical digits to enter the *tenth* or *bille place*, where the distinctive feature of the new introduction would make its first appearance; therefore, in this case, there would be no improvement. 2d. That the explorations of Science through the immense starry space must necessarily call for very large numbers, to numerate which the well-established and perfect "English Method" (9) would be preferable to the new introduction, on the same ground that a merchant, in heavy transactions with foreign traders, would prefer large bank-bills to small ones in making his payments on equal amounts. Hence the method of short periods, though consistent and correct, would introduce no improvement.

12. When arithmetical investigations are conducted on Algebraic principles, it is often convenient, on the "black-board" to denote a given number of ciphers, by

putting the *given number* inside of a single cipher, thus: a million may be denoted by 1 (6).

13. Several arithmetical works in this country contain what is called the French Method of Numeration. The structure of this method will be presented according to the plan pursued from (5) to (9); and the resulting terms, when numbered and named, will be as follows: The 1st term is 1000, *a thousand;* 2d, 1000000 = 1000 $(1000)^1$, a *million;* 3d, 1000000000 = 1000 $(1000)^2$, a *billion;* 4th, 1000 $(1000)^3$, a *trillion;* 5th, 1000 $(1000)^4$, a *quadrillion;* and so on.

Now, it appears from the foregoing that the inventor of this method first took a series of terms formed according to (10) and then multiplied each term by 1000; after this he took names which had been accurately defined and long in use, as applied to the English Method, (see 9); and after perverting their true meaning by applying them to his diminutive terms, as shown above, he thus brought forth, in a confused jumble, his complete "Babel." A production like this might have been expected from one who thought in French; but how one who thinks in English can adopt such stupid jargon is to me a perfect mystery.

NATURAL RESOURCES OF THE UNITED STATES.

BY PROF. SANBORN TENNEY, WILLIAMS COLLEGE.

Notwithstanding all that has been said and written about the extent of our territory, and about our natural resources, few persons, probably, really have any just conception of the vastness of our country, and fewer still, perhaps, have any true conception of the vastness of our natural resources. Few realize that we have single States, as California, nearly as large as all of France, and that such a State as Texas is as large as France and three such States as Massachusetts besides; that Great Salt Lake is about a quarter as large as Massachusetts, and that the Great Lakes occupy an area nearly thirty thousand miles greater than all New England; that such a river as the Platte drains an area greater than all New England, New York, and Pennsylvania; and that the Mississippi drains an area of more than two millions four hundred and forty thousand square miles.

But passing by all considerations in regard to our vast areas, and also passing by our absolutely inexhaustible formations of granite, much of it of remarkable durability and beauty, our not less unexhaustible formations of marble and of slate, and other useful materials for architectural purposes, let us for a moment consider our resources in iron, coal, and petroleum.

The iron regions of northern New York, of New Jersey, of Missouri, and of Lake Superior, contain an amount of iron too vast to be comprehended by the human mind. In the Adirondack region of northern New York there are beds of iron ore more than a hundred feet in thickness, and one bed reaches the enormous thickness of 700 feet! In Missouri, less than a hundred miles south of St. Louis, there are whole mountains largely composed of iron ore. One of these mountains, Pilot Knob, is 228 feet high, and its base covers 500 acres, and is estimated to contain 230,187,375 tons of iron ore above the ordinary level of the region; and it is estimated that each foot of descent below the ordinary level of the region, will yield 3,000,000 tons of ore.

But these regions, wonderful as they are in their rich accumulation of iron, are rivaled by the iron region on the south side of Lake Superior. This region is in some respects the most wonderful in the world. It is a hundred and fifty miles long, and in some places seventy miles wide, having an area nearly as large as the State of Connecticut, and abounding in vast deposits of iron, that perhaps are not excelled in richness anywhere in the world. Here 1,000,000 tons of magnetic and specular ores are obtained annually, and the amount can be easily increased in accordance with the demand. And now when we add to these the vast deposits of iron in the western portions of New England, Eastern New York, New Jersey, Pennsylvania, Ohio, and other States, we are justified in saying that notwithstanding the vast amount of iron which we import every year, we have iron enough in the rocks of the United States to supply all of our own wants, and those of many other nations besides. And it is probably not too much to say, that the time is not very far distant when we shall send iron to the very countries from which we import it to-day.

But the great importance of our iron deposits is only fully apprehended when we understand how vast are our deposits of fuel in the form of coal. The Rhode Island and Massachusetts coal field embraces about 500 square miles; the Appalachian coal field, stretching from Ohio and Pennsylvania to Alabama, 60,000 to 80,000 square miles; the Michigan coal field about 5,000 square miles; the Indiana, Illinois, and Kentucky coal field about 60,000 square miles; the Iowa, Missouri, Kansas, and Arkansas, perhaps 100,000 square miles; or a total of 200,000 to 240,000 square miles of coal fields in the United States, east of the Rocky Mountains.

These areas stand in striking contrast to those of the coal fields of Europe, even when we include the large areas of Great Britain; for Belgium has only 500 square miles of coal field; France only 2,000; Spain only 4,000; and Great Britain herself, till recently justly celebrated for her coal deposits, has only 12,000 square miles, giving a total of 18,500 square miles in all Europe; or only about a quarter of the area of the coal fields stretching from Ohio and Pennsylvania to Alabama, inclusive.

But we must bear in mind that these areas, now enu-

merated, are only a portion of the vast coal-field areas of our country. Besides these there are thousands of square miles of our territory in the Rocky Mountain region underlaid with coal, only it is of a later geological age, belonging to the cretaceous and tertiary periods, while the areas enumerated above are of the carboniferous age. The cretaceous and tertiary coals also underlie large areas in California and Oregon.

In most of the areas enumerated above there are several beds of coal separated from one another by rocky strata. In the valley of the Schuylkill, Pennsylvania, there are about fifty beds of coal, and of these there are twenty-five that exceed three feet each in thickness; and one, the Mauch Chunk bed, is from thirty to forty feet thick! The aggregate thickness of the coal beds themselves as they appear in Pennsylvania, is 120 feet in the region of Tamaqua and Pottsville, and 25 feet in the region of Pittsburg. The aggregate thickness of the coal beds of Indiana, Illinois, and Kentucky is from 15 to 20 feet. The coal beds of the Rocky Mountain regions and of California vary from a few feet to as high as 26 feet, the latter being the thickness of one of the cretaceous and tertiary coal beds in Wyoming as it is found at Evanston.

These facts indicate an amount of coal too vast for human comprehension, and we can only approximate a comprehension of the vastness of the quantity by computing the length of time it would last us at the present rate of the consumption of coal.

It has been estimated by Prof. H. D. Rogers, in his Report on the Geology of Pennsylvania, that the coal of North America amounts to 4,000,000,000,000 tons. This estimate was made before our present knowledge of the coal beds of the Rocky Mountain regions. So that that estimate is probably not too high for the amount of coal in the United States alone.

At present we are mining and consuming about 40,000,000 tons of coal in a year, more than half of which is bituminous; all of the coal west of the Appalachian mountains is of this variety. At our present rate of the consumption of coal, then, and taking the above figures as reliable, we have coal enough in the United States to last 100,000 years!

But vast and incomprehensible as this amount of coal is, it is not by any means the full extent of the supply of fuel which we have stored up in our rock formations. For petroleum also must be reckoned among our fuel supplies, although not as yet used to any considerable extent for that purpose. How vast the supply of this important substance is, no one can tell; but we do know that single regions — as the Oil Creek region of Pennsylvania—have yielded 900,000 barrels of this rock-oil in a single year—more than twice the amount of oil furnished in a year by the whole whalefishery of our country in its best days. And there is no reason to doubt that there are many other places just as rich in oil as Oil Creek; and they will probably be discovered as fast as new supplies of petroleum are actually needed. And it may be added here, that the amount of this substance in places where apparently it does not exist, is probably even greater than in many of the regions which have already become famous for its abundance.

Dr. T. Sterry Hunt gives us some idea of the marvelous amount of petroleum that exists in some of the paleozoic rocks, even where men make no attempt to secure the oil. He found by chemical analysis that a certain limestone of the Niagara group, near Chicago, holds 4.25 parts, by volume, of petroleum in 100 parts of the rock. And this being so, he finds that a layer of this rock one mile square and one foot thick will contain 1,184,132 cubic feet of petroleum, equal to 8,850,069 gallons. And he further shows that, taking the minimum thickness of the oil-bearing limestone at Chicago at 35 feet, there are 7,743,745 barrels of petroleum in each square mile!

The total yield of the Pennsylvania oil-wells from 1860 to 1870 is estimated at 28,000,000 barrels; but vast as the amount is, it is less than the amount contained—and which at some future day may be extracted—in four square miles of the limestone near Chicago, according to the data above given. Yes, it is probably not too much to say that in the far future, when the ordinary great reservoirs of oil shall have been exhausted, the solid rocks themselves will be subjected to chemical processes, and petroleum will thus be obtained perhaps in even greater quantities than are secured from the oil-wells of to-day.

Inheritable Characteristics.—Heredity is especially noticeable in the continuity of physiological and pathological conditions. It is very clearly evident in the expression and features of the physiognomy. This was observed by the ancients; hence the Romans had their Nasones, Labeones, Buccones, Capitones, etc. (*Big-nosed, Thick-lipped, Swollen-cheeked, Big-headed*). Of all the features, probably the nose is best preserved by heredity: the Bourbon nose is famous. Heredity also manifests itself by fecundity and longevity. In the old French noblesse there were several families which possessed high procreative vigor. Anne de Montmorency who, at the age of over sixty-five years, could still, at the battle of St. Dennis, smash with his sword the teeth of a Scotch soldier who was giving him the death-blow, was the father of twelve children. Three of his ancestors, Matthew I., Matthew II., and Matthew III., taken all together, had eighteen, and of these, fifteen were boys. The son and grandson of the great Condé had nineteen between them, and their great-grandfather, who lost his life at Jarnac, had ten. The first four Guises reckoned in all forty-three children, of whom thirty were boys. Achille de Harley had nine children, his father ten, and his great-grandfather eighteen. In some families this fecundity endured through five or six generations. The average length of life depends on lo-

cality, diet, stage of civilization; but individual longevity appears to be completely freed from these conditions. It is observed among those who lead the most laborious lives, as well as among those who take the greatest care of their health, and it seems to be connected with some inner power of vitality transmitted to individuals from their forefathers. So well known is this fact that, in England, life-assurance companies receive from their agents statements as to the longevity of the applicants' ancestors. In Turgot's family, the age of fifty-nine was very rarely exceeded, and the man who made that family illustrious, had a presentiment, so soon as he had reached fifty, that the close of his life was not distant. Albeit he had all the appearance of good health and of great vigor of temperament, still from that time forward he held himself ready for death, and, in fact, did die at the age of fifty-three.

Heredity often transmits muscular strength, and sundry other motor activities. In ancient times there were families of athletes, and the English have families of boxers. The recent researches of Mr. Galton, as to wrestlers and oarsmen, show that the winners in the contests in which these men engage generally belong to a few families in which agility and dexterity are hereditary. Suppleness and grace in dancing are also transmitted, as is shown in the case of the celebrated Vestris family. The same is to be said with regard to various peculiarities of voice, such as stammering, nasality, and lisping. There are several families who are naturally singers. Children born of babbling parents are themselves babblers by birthright. Dr. Lucas cites the case of a servant-maid whose loquacity knew no bounds. She would talk to people till they were ready to faint; but she would also talk to animals and to inanimate things. Even when she was quite alone she talked to herself aloud. She had to be discharged; "but," said she to her master, "I am not to blame; it all comes from my father. He had the same fault, and it drove my mother to distraction; and his father was just as I am." —E. Papillon in Popular Science Monthly.

The Material Progress of California.—The progress of California in material enterprises is something quite wonderful and startling. A year brings about changes for which one can hardly look for in ten years. It is but eighteen months ago that the idea of a system of irrigation, to include the whole of the San Joaquin Valley, was broached, and then the most sanguine of the projectors thought that to give their enterprise a fair start would require years, and a great number of shrewd men believed the whole scheme visionary. But a few experiments showed to land-owners and capitalists the enormous advantages of irrigation, and now this scheme has sufficient capital behind it, and landholders are offering subsidies and mortgaging their lands to raise means to hasten the completion of the canal. Two years ago the reclamation of the tule lands, though begun, advanced slowly, and arguments were required to convince men that tule land was a safe investment. But this year eight hundred miles of levee will be completed, and thousands of acres will bear wheat next harvest which were overflowed eighteen months ago. Two years ago the question whether California could produce good raisins could not be answered; but last fall raisins which sold in the San Francisco market beside the best Malagas, were cured by several persons, and it is now certain that this State can produce—and from its poorest side-hill lands—raisins enough to supply the whole Union. Not a year passes but some new and valuable product of the soil is naturalized in this State; and one who has seen the soil and who knows the climate of the two great valleys, who sees that within five, or at most, ten years, all their overflowed lands will be diked and reclaimed, and all their dry lands will be irrigated, and who has, besides, seen how wide is the range of products which the soil and climate yield, comes at last to have, what seems to most Eastern people, an exaggerated view of the future of California. But, in truth, it is not easy to exaggerate, for the soil in the great valley is deep and of extraordinary fertility; there are no forests to clear away, and farms lie ready-made to the settlers' hands; the range of products includes all those of the temperate zone, and many of the torrid; the climate is invigorating and predisposes to labor; and the seasons are extraordinarily favorable to the labors of the farmer and gardener. The people have not yet settled down to hard work. There are so many chances in life out there that men become over-enterprising—a speculative spirit invades even the farm-house; and as a man can always live—food being so abundant and the climate so kindly—and as the population is as yet sparse, men are tempted to go from one avocation to another, to do many things superficially, and to look for sudden fortunes by the chances of a shrewd venture, rather than be content to live by patient and continued labor. This, however, is the condition of all new countries; it will pass away as population becomes more dense. And, meantime, California has gifts of nature which form a solid substratum upon which will, in a few years, be built up a community productive far beyond the average of wealthy or productive communities. This is my conclusion after seeing all parts of the State more in detail than perhaps any one man has taken the trouble to examine it.
—C. Nordhoff, in Harpers' Magazine for November.

Extemporaneous Efforts.—Marshall, of Kentucky, one of the most brilliant orators of his time, and a man of large scholarly attainments, who had as much of that mystical quality called genius as any of his contemporaries in Congress, was full of affectation in this regard. He spoke readily without preparation, his ideas following each other consecutively and with uncommon force; but he never trusted to the inspiration of the moment when there was opportunity for studying up the subject and arranging his thoughts in advance. He had a habit of absenting himself from the capitol for days at a time, every hour of which he devoted to reading and study, his acquaintances generally supposing him to be en-

gaged in a debauch. After getting thoroughly crammed and armed at every point, he would come into the House looking exhausted and haggard, giving color to the notion that he had been on a frolic, and watching his opportunity, would pour forth the fruits of his study, in a strain of off-hand, striking eloquence that hardly ever failed to astonish his hearers. And the remark was often heard, "What a brilliant man! What could he not accomplish if he was industrious and regular in his habits!"

Mr. Preston, for some time Mr. Calhoun's colleague in the Senate, was an accomplished gentleman, and a very popular orator. He never spoke without commanding the attention of his hearers, and few men in Congress had a higher reputation for brilliant extemporaneous eloquence. But he never spoke without the most ample and careful preparation. Soon after he retired from Congress he was chosen president of a college in South Carolina. In an address to the students, he said he knew no such thing as genius or natural inspiration. Whatever of reputation he had acquired was by dint of constant, untiring labor. He had trusted to study and hard work solely. He never spoke in Congress, or to a popular assemblage without arranging what he had to say, and even premeditating his sentences, and the precise collocation of his words. And he assured his hearers that the only road to public distinction lay through the field of study and research.

Mr. Webster was so thoroughly instructed upon all subjects which came under discussion in Congress that he was equal to almost any occasion, and rarely needed any special preparation. And yet he was not above the weakness of concealing his studies, and the sources whence he drew his inspiration. No man better understood the weight and value of language than Mr. Webster, and what he said was always marked by precision and perspicuity; but when coping with a formidable antagonist he omitted no means that promised to aid him in the contest. He was accustomed to speak of the master-production of his life, his celebrated reply to Hayne, as a sort of casual effort, made on the spur of the moment, without much previous consideration.

Probably the two men in public life who could most safely trust to their own resources and acquirements, under all circumstances, were Mr. Adams and Mr. Calhoun. The endowments of Mr. Calhoun were of a higher order, and his creative power was superior to that of Mr. Adams; but the "old man eloquent," as he was called, had a memory so tenacious, and his knowledge was so extensive and exact, that he never seemed to need any special preparation. He was the most laborious and methodical man in Congress, and probably in the country. He kept a voluminous diary, in which every event, incident, or circumstance of the day was carefully noted down; and this, with his habits of industry, made him a very doctor in all matters of controversy and argument. It was a knowledge of his complete equipment and his power as an antagonist that prompted the reply of Mr. Clay, when asked when he purposed to renew the discussion with Mr. Adams on the vexed question of the fisheries of the Mississippi, as connected with the treaty of Ghent. Finding himself getting the worst of the argument, Mr. Clay closed the consideration of the matter, so far as he was concerned, with the remark that he should drop the subject, hoping to renew it at some future period more favorable for calm discussion, when he expected to show that Mr. Adams was altogether in the wrong. Some time afterward a friend asked him when he proposed to reopen the controversy. "Never!" was his emphatic reply. "A man must be a born fool who voluntarily engages in a controversy with Mr. Adams on a question of fact. I doubt whether he was ever mistaken in his life. And then, if he happens to be in doubt about anything, he has his inevitable diary, in which he has recorded every thing that has occurred since the adoption of the Federal Constitution."

—From "Recollections of an Old Stager," in Harper's.

Relation of the Air to Clothing.— The following statements of general interest are specially reliable, being contained in a lecture by Professor Pettenkofer, of Munich, who is known as high authority on such subjects:—Although the warmth of the body is the result of respiration, it is a singular fact that the normal temperature of the blood of the African is the same as that of the Esquimau, or about 99½°, while the air surrounding them and inhaled by them, may differ as much as 180° in temperature; neither does this temperature vary, in a state of health, more than two degrees, though the temperature of the air may vary 72°. The heat generated by the human body in twenty-four hours is sufficient to raise thirty quarts of cold water to the boiling-point; and of this the regular processes of nutrition require only a definite part, and the larger portion must be given off through radiation, evaporation, or conduction. When heat is lost by radiation, as in sitting near a cold window, or other cold object, the impression of a draught may be created, although the air may be perfectly calm, heat being simply given up to the colder object. Thus, while the temperature of a room may remain constant, different sensations may be experienced, dependent on the surrounding objects. A much larger amount of the superflous heat is lost by evaporation; and during severe exercise, when more heat is developed, evaporation is also more rapid, and the normal temperature of the blood restored. A "cold" is caught when the evaporation is too rapid. But little heat is lost by conduction. The particles of air in contact with the body, become warm, and are replaced by colder ones, creating a current, which is insensible, because of less velocity than three feet per second. In better conductors cooling takes place more rapidly, water of 61° seeming much colder than air of 61°. These three modes of cooling, however, supplement each other, and act together. Thus a current of warm air

cools more rapidly than calm, cooler air, not only by reason of renewal of the air, but by favoring evaporation.

The chief object of clothing is to surround the body artificially with a warm climate, poor conductors being consequently selected. The cooling process is, however simply checked by the clothing. Even the thinnest, finest fabric, as a veil, diminishes loss by radiation. But the inclosure of air is especially effective, and consequently garments of porous heavy material are warmer than those which are more compact. Felt shoes, permeable to air, are warmer than leather or india-rubber ones, while the latter soon become unendurable because of checked ventilation. The more hygroscopic the material, the colder the clothing, because it is a better conductor when moist. Linen and silk are for this reason colder than wool, and also because the latter retains its elasticity when moist, and keeps the air within its pores. And our bed, which is, in fact, our sleeping garment, is of special interest. It must be warmer than our walking clothing, since less heat is developed during sleep. Consequently loss of sleep is very exhausting. The feather-bed possesses in the highest degree feeble conducting power, elasticity, and permeability to air ; but, if too thick or soft, resembles more an air-tight garment. The house, too, may be regarded as an extended piece of clothing, so gradual is the transition from bodily garments to it (the step from the wide garment of the Arab to his felt tent being a small one), and in hygienic functions, they agree precisely in regulating our relations with the surrounding air. The ease with which a current of air may be blown through a brick, pieces of mortar, wood etc., by glass tubes cemented to opposite sides, and the passage of water (so much denser) through these substances, show how imperfectly our walls, of whatever material, and however thick, exclude the air from us. We do not perceive the free passage of air through them because the current is too slow.

—Editor's Scientific Record, in Harper's Magazine.

A PENNSYLVANIA judge has decided in the case of a teacher charged with assault and battery on one of his pupils in a Tyrone school, that it does not follow in all cases that because there has been a beating, therefore it is unlawful. Though pain and injury have been inflicted, beating, in the case of a teacher charged with assault and battery, must go further than the mere striking, before criminal prosecution can be sustained. Criminality depends not upon the beating alone, but upon the degree of force used, and the cause of the beating. A master may inflict punishment upon his apprentice, a parent upon his child, and a teacher upon his pupil, without necessarily being guilty of battery. But neither parent or teacher can beat the child to gratify a cruel or revengeful disposition, no matter for what cause revenge may have risen. The punishment must have for its object the reformation or good of the child, or the maintenance of order in the family or school room. Any teacher who maliciously or cruelly beats a pupil should, without hesitation, be convicted of assault and battery.

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EDITORIAL.

IT is pleasant to be able to record this year as a successful one for the CONNECTICUT SCHOOL JOURNAL. The respectable and rapidly increasing circulation,—the evidence that teachers are recognizing the practical utility of our columns to their work—the greater readiness which our more experienced instructors are manifesting toward contributing to our pages, and a good outlook for valuable contributions next year, are certainly elements of success and occasions for good cheer.

THE articles now being published in THE JOURNAL from the pen of Dr. Leigh, were originally prepared for the columns of "Pronouncing Orthography, or The Key to English Print," through which the author proposes to communicate with the friends of education with regard to his plans for the prevention and cure of illiteracy, and the improvement of primary schools. The brief statement below,* extracted from the same source, together with the specimens given already, will convey a very good idea of this "union of our printed and spoken languages."

APROPOS of the suggestive History of Plainfield Academy, which Rev. Lucian Burleigh has so pleasantly brought to a close in this number, we beg leave to extend a greeting and an invitation to the Principals and other teachers of private Academies in this State. Mr. Burleigh has done a valuable service in bringing the Plainfield Academy, in its estimable past and its present, so thoroughly into the sphere of acquaintanceship, and consequently of the sympathy, of our public school teachers. Why can we not in this, and in still more effectual ways, be brought into an intelligent sympathy with other of our academical institutions, which may be of value both to us and to them?

* This print was first publlshed in 1864 under the above title. For all practical purposes it explains itself. A special form of a letter is used for each sound of it. The hair-line letters are silent. The accent is on the first syllable, or marked (ˈ). The pronunciation is according to our two standard dictionaries. Those who wish to know more of it will please address EDWIN LEIGH, New York City.

Our public-school teachers need to know more, in an intimate, practical way, of these institutions and of their instructors. Now, they know next to nothing about many of them. It is no rare thing for our common-school teachers to be inquired of as to the best Academy for pupils who have finished with their schools and are ready to go up higher. A better acquaintance with these institutions would enable these teachers to be of some use in recommending the right one. We cordially invite those connected with such academies, for our good and theirs, to unite with us in our enterprises of mutual interchange of thought and acquaintanceship. Let them come to the annual meetings of our State Association, and take part in the discussions; let them take the SCHOOL JOURNAL, and also contribute to it of their experience. In so doing they will both give and receive benefit. We were glad to welcome to our conferences, at the late meeting of the Teachers' Association at Hartford, the new Principal of the Suffield Literary Institute, whose presence was felt in our deliberations. Many of our teachers who knew little beyond the name of that Seminary, can now feel safe in recommending pupils to the care of one with whose merits they have become somewhat acquainted. But where were the representatives of Woodstock and of Bacon Academies, and of others? Let us hear from the worthy Principals of these private Academies, of which our State is so justly proud.

PARENTS must be won, not driven; the teacher must not dictate to them arbitrarily nor rigidly, through his school-room regulations and penalties; in dealing with their children he must not, as from a throne, enact laws for them as inflexible as the laws of the Medes and Persians; as unyielding to requests and views of the parents as if they were utterly beneath him in authority over their own children. Every parent is "ex-officio" endowed with an inalienable right of decision in the training of his own child; every parent, however low in the social scale, is thus invested with a dignity of authority and right in this matter which teachers are solemnly bound to respect. The teacher, too, has his peculiar rights in school training, arising from his professional skill and responsibility. That these two undeniable prerogatives may not clash, school discipline must be so arranged that, while it possesses sufficient rigidity to make it respected and effective, it may possess sufficient plasticity to enable it to mould itself somewhat to parental desires, or even prejudices. This requires consummate skill; but no good teacher can exist without skill. The simple question of duty brings us to this conclusion, since the teacher is in reality the *colleague* of the parent, and not an independent and higher authority. But simply as a matter of *policy* we reach the same result of a sagacious deference to parental desires in the administration of discipline; or at least of a willingness to conciliate parents, to respect even their whims, and to endeavor to win them over to right ways of thinking, instead of repelling them by peremptory measures. As a general rule, they will concede to the teacher all the discipline he wants, if he will only make them a party to this discipline. One who is private tutor in a family, brought daily face to face with the parents, quickly discerns the policy of this conciliatory spirit. The case is not essentially altered because the teacher is five blocks away, and has other children under his control. It is a good rule for a school teacher, so far as may be possible, to bear individual parents as truly in mind, in the daily government of the pupils, as he would were he a private tutor in their household.

ANNALS OF EDUCATION.

HARTFORD.—We are happy to insert the following resolution of the Hartford Board of School Visitors, whose praise of Rev. Dr. Fisher is thoroughly deserved. Like many of the most faithful workers, his conscientious zeal has raised up enemies against him, but those who appreciate true excellence are firmly his friends:

"The Board of School Visitors are unwilling to close this year's service without bearing witness to the efficiency, value, and general acceptableness of the service of Rev. C. R. Fisher, the Acting Visitor. During this, as in previous years, we have felt that our school interests have been in the hands of a gentleman, whose honor, purity, and fidelity are unassailable. His devotion to duty, and his adherence to the laws and regulations of the State may have been criticised, and perhaps blamed by some; but we have every reason to believe that Mr. Fisher has secured the confidence of all who have known his fidelity, and have seen him in his often thankless and always unshrinking devotion to duty.

"We are well aware that the Acting Visitor stands in a position where thoughtless criticism may often wound him; but we cheerfully testify that as a Christian and a gentleman, we believe that Mr. Fisher has discharged his trust with unvarying tact, thoughtfulness, and conscientiousness."

Passed in a meeting of the Board of Visitors, Oct. 18, 1873.

REPORT OF U. S. COM. OF EDUCATION.—The report of the U. S. Commissioner of Education for 1872 contains a well digested mass of valuable information. It fills with the appendix a volume of over

one thousand pages, and in its compilation is a vast amount of judiciously directed labor. We glean from the abstract the following items of information :

Of Normal Schools, there are enumerated 101, having a total of 11,778 students. In this connection the Commissioner argues that there are 14,507,658 youth due at school, and that allowing 40 pupils to a teacher, there should be 362,691 teachers. Hence the inadequacy of the normal training of the country, for, allowing the whole number of students in the normal schools to complete the curriculum, we should have, at the largest reasonable estimate, only 4,000 trained teachers to enter the profession annually, while the changes by death, retirement, etc., require 128,00 new teachers.

Of Academies the number reported is 173 more than in 1871, being in all 811, with 98,929 students, and libraries having 378,809 volumes.

Of Colleges, there are 298 institutions reporting to this Bureau that class themselves as such, of which 30 report only preparatory students, and 217 report collegiate students. The 217 colleges report 19,260 students in the collegiate course, of whom 1,419 are females.

Of institutions for the superior instruction of females, the number reported is 175, with 1,617 instructors, of whom 449 are male and 1,168 female, and a total of 12,288 students.

Of Schools of Science endowed by the national grant of lands, the number that have organized is 38. There are also 32 similar institutions, including collegiate departments, not endowed by national land grants.

Of Theological Schools the number is 108, with 435 professors and 3,351 students.

Of Law Schools there are 43, with 151 instructors and 1,976 students.

Of Medical, Dental, and Pharmaceutical Institutions there are 92. Of these 61 are known as regular, with 607 instructors, and 4,887 students ; 3 as eclectic, with 25 instructors, and 259 students ; there are 9 dental schools, with 58 instructors, and 199 students ; and 13 pharmaceutical schools, with 36 instructors, and 650 students

Of Reform Schools there are 26, with 331 superintendants and assistants, and 4,230 inmates.

Of Orphan Asylums there are 77, with 852 superintendents, and assistants, and 10,324 inmates.

Of Deaf Mute institutions, there are 36 with 267 instructors and 4,337 pupils.

Of Institutions for the Blind there are 27, with 513 instructors and 1856 inmates.

On the subject of the health of scholars the Commissioner shows from data furnished by the census, that in 1870, 26,329 children died between five and nine years of age ; 15,979 between ten and fourteen years of age ; 20,262 between fifteen and nineteen years of age ; and a total of 88,551 between the ages of five and twenty-four years. School furniture he considers responsible for much of the curvature of the spine. Bad print, bad light, and bad position of the head while studying, cause distortion of the eye, and numerous maladies are directly traceable to unfavorable conditions of ventilation, heat, cleanliness, exercise, and habits of study. He emphasises the necessity of public sanitary measures, and commends public parks as sanitariums.

Book Notices.

A Library of Poetry and Song ; being choice selections from the best poets, with an introduction by William Cullen Bryant. Published by J. B. Ford & Company, New York City.

This charming and highly valuable book is eminently a work for teachers. Though the compilation has not been exactly and entirely the work of Mr. Bryant, yet he has had so large a share in its construction that it is virtually his. Thus, in his introduction to the book, Mr. Bryant says : " In its progress it has passed entirely under my revision, and although not absolutely responsible for its compilation or arrangement, I have, as requested, exercised a free hand both in excluding and in adding matter according to my judgment of what was best adapted to the purposes of the enterprise." The introduction alone, which is virtually an essay on English literature from Chaucer's time to the present day, is of high value to the teacher or literary student. The poems are classified, not chronologically at all, but under such appropriate headings as Poems of Childhood, Poems of the Affections, of Sorrow and Adversity, of Religion, of Nature, of Peace and War, of Adventure and Rural Sports, Humorous Poems, etc. The whole forms a massive collection of the very gems of poetical inspiration of every shade of sentiment and of all ages ; and the typography, the paper, and the binding are worthy of so choice a book. It is no small treasure to hold in so portable a handful, this elegant collection of over 1,500 selections from more than 400 authors, the choicest and most complete general collection of poetry yet issued, as the publishers justly claim. It is no small thing to have the assurance that our master-poet — our scholarly Bryant—has estimated with his finely-cultured criticism, and has approved of every individual member of this collection. The public have evidently already appreciated this fact, for within six months of its first issue, the twentieth edition has already been called forth. Teachers will find this book a prize for use with classes in English literature or studies in English Composition. All teachers will find it one of the brightest ornaments of their libraries. There is no book which we have

set on our shelves with more satisfaction for several years, and we advise other teachers, by procuring the book, to put themselves in the way of experiencing the same sensation. It must be noted that this book is sold only by subscription.

THE ART OF COMPUTATION: Designed to Teach Practical Methods of Reckoning with Accuracy and Rapidity. By David White Goodrich, late Lightning Calculator, Erie Railway. Third Edition; revised and enlarged. Published by D. W. Goodrich & Co., New York City.

After a careful examination of this little book, we are prepared, not merely to endorse it, but to express our firm conviction that it, or something like it ought, to be used in every school. Its author is not one of the "show" lightning calculators who mix up genuine processes with charlatanry, but is an intensely practical man who has devised or adapted his rapid method as a necessity in the laborious work of an accountant for the Erie Railway. He has here attempted most successfully to give the public a knowledge of the various methods of rapid computation in all the leading departments of arithmetic. These instructions extend through the cardinal operations of Addition, Subtraction, Multiplication, and Division, and through Denominate Numbers, Fractions, Interest, The Applications of Measurement in Bricklaying, Plumbers' Work, etc. A remarkable clearness characterizes every page, and for every slow reckoner, who has been stumbling all his days over the correct addition of a few simple columns, it goes right to the spot. It is not got up for arithmetical geniuses, but to make a rapid reckoner of any average ordinary mind. Not many minutes after studying its pages we found ourselves adding up columns of *four* figures with delight. It would have been invaluable to us could we have had it in our boyhood, but at this late date of our activity, it will much quicken our ability to reckon.

The time-honored processes of our arithmetics are never followed by rapid accountants. Let our teachers then introduce these practical methods in their place, and the school-room will be far more respected by business men.

A Comprehensive Calendar, instantly adjustable to any month in the year, accompanies this book. It was devised by Mr. C. W. Bardeen, and will be found frequently of much service.

EDUCATION ABROAD, and other papers. By Birdsey Grant Northrop, LL.D. Published by A. S. Barnes & Co., New York and Chicago.

We are favored with an advance copy of this forthcoming book. It is a collection of valuable and suggestive papers on educational topics, which have apparently crystallized into this form from out of the rich experience of our State Secretary. Two of the Lowell Lectures, delivered by Dr. Northrop last winter, are here included,—the remainder being reserved for another work shortly to be published.

The subjects discussed are both timely and practical, as will be seen from a list of them, which we subjoin:—Should American Youth be Educated Abroad; Legal Preventation of Illiteracy; Culture and Knowledge; The Professional Study; Study and Health; Labor as an Educator; Educational and Industrial Arts; Education and Invention; Labor and Capital Theoretically Harmonized; Labor and Capital Practically Harmonized.

The first paper alone, on the foreign education of our youth, has already attracted more attention than any educational document of the kind that has lately appeared. It has struck the right key. It has elicited the warmest commendations from many of our ablest thinkers, and even from distinguished foreigners. It cannot fail to go far toward checking its pernicious tendency of our people to de-naturalize their children—our future citizens. Our nation has cause to thank Secretary Northrop for his able attack on this folly.

The other papers show a thorough appreciation of the actual wants of the day in matters of education and general culture. The author's statements are founded on extensive observation, under most favorable circumstances. The important suggestions here made affect the very foundation of our method of teaching. Every teacher, therefore, will do well to read this timely book.

CAESAR'S COMMENTARIES ON THE GALLIC WAR; accompanied by a Latin Ordo, and illustrated with English Notes, Explanatory and Critical. By "C. A." Published by John Wiley & Son, New York City.

This comprises the first five books of the Commentaries, with an Ordo for the first four. This Ordo, which is the only distinctive feature, is simply an arrangement of the Latin text in the exact order of the English translation, as a help to the student. It does not immediately accompany the main text, but follows it at the end of the book. In adopting this feature, the author contends, 1st, that it is preferable to the paraphrase of the text of the Delphini editions, because it contains the pure Latin phraseology, which the paraphrase does not; nor does it require an additional effort of translation, as the paraphrase does. 2d, That it inspires

the pupil with confidence, since he will no longer, in addition to other difficulties, be discouraged by an inverted and involved phraseology. 3d, That it enables him to traverse more preparatory ground in the same time. 4th, That more time will be gained for enlargement of the vocabulary, to syntax and analysis, etc. It is also claimed that it renders no more than proper assistance, and that the recitations being always made from the main text, the student is kept well familiarized with the classical phraseology. Whether this expectation with be realized, or whether this plan will operate to produce less familiarity with the true order of a Latin sentence and less readiness to translate other Latin lacking an Ordo, remains to be seen. We should certainly deprecate the use of an Ordo as a general thing in school text-books. If admissible at all, it should be only for the few chapters read by beginners. The book is issued in very substantial and neat form for academic use.

ANNUAL REPORT of the Board of School Visitors of the town of Hartford, for the year ending August 31, 1873.

We have just received this report, nominally that of the Hartford Board of School Visitors, but of course the work of the indefatigable and excellent Acting School Visitor, Rev. E. R. Fisher. We note the following points embraced in the Report: Number of children in Hartford, as enumerated, between the ages of 4 and 16 years, January, 1873, 9,138; number registered in the schools, 1873, 6,000, an increase of 213 over 1872, when the local enumeration was 9,128. This is exclusive of 404 in the High School, and 501 in evening schools.

There are sixteen school buildings, nearly all substantial edifices, and 128 teachers. One of the most elegant school houses in the State has just been finished in the West Middle District. The schools generally are prosperous. Mr. D. P. Corbin, Principal of the West Middle, has been confined to his bed since July 28, by a dangerous sickness. His absence is much felt.

The plan of written examinations for teachers is adopted. The employment of so-called apprentices is advised in all large schools, for the proper supply of all temporary vacancies in the teachers' corps. Instruction in German is partially adopted, and recommended for all larger schools. Two evening schools have been carried on—pupils ranging in one from 12 to 40 years of age. Whole attendance of both, 501.

The establishment of a special ungraded school as a place of correction for incorrigibles and truants from other schools is recommended, from which the reforming boys may be returned again to their schools, and the worst cases sent to the Meriden Reform School.

The High School is in its usual degree of prosperity; the retirement of Miss Margaret Blythe, the accomplished teacher of English Literature and Modern History, is very much felt and regretted.

LESSONS ON POLITICAL ECONOMY, for Schools and Colleges. By J. T. Champlin, President of Colby University. Published by A. S. Barnes & Co., New York City.

This book is not intended to be an exhaustive treatise on the subject, but simply a brief presentation of some of the leading facts of political economy as a basis for any fuller instructions that the teacher may see fit to give. It is, in the main, a fair treatise on the subject. We think, however, that the author has gone beyond the proprieties of a text-book in his strictures on the financial policy of our government during and since the war, on the National Banking system as a financial measure, and on Usury Laws. These are all questions on which the most eminent and candid men are divided to-day, while the official intelligence of the country stands to-day, for the most part, committed to the views repudiated by the author. With what propriety, for instance, can the teachers of the public schools of Connecticut, enployed by the State, take their classes through the fierce section condemnatory of Usury Laws, filled with such statements as this: "Usury Laws, therefore, while they are entirely unavailing, are decidedly immoral in their tendencies"—when exactly such a law is the law of the State, which the pupils are bound to respect and obey? We hope these sections may be more prudently moulded in future editions.

TEXT-BOOK ON INTELLECTUAL PHILOSOPHY for Schools and Colleges. By J. T. Champlin, President of Colby University. Published by Woolworth, Ainsworth, & Co., New York and Chicago.

CHAPTERS ON INTELLECTUAL PHILOSOPHY, designed to accompany Champlin's text-book on the same subject.—*Ibid.*

President Champlin's well-known text-book is here re-issued in a greatly improved edition. While the author makes no claim to any important original developments of the subject, he has succeeded in presenting it in a well digested method for class use. The pamphlet of "Chapters" on the same subject is now put out by the author as a proposed substitute for certain chapters in the original work; if they meet with public approval they will be embodied hereafter in the main treatise.

A LEXICON TO XENOPHON'S ANABASIS, adapted to all the common editions. By Alpheus Crosby, Professor Emeritus of the Greek Language and Literature in Dartmouth College. For the use both of beginners and of more advanced students. New York and Chicago: Woolworth, Ainsworth & Co.; 1873.

There are arguments both for and against the use of a "special lexicon" in commencing the reading of Greek. Not much, however, can be said against the use of this little work of Prof. Crosby's by beginners, having the marks, as it does, of having been prepared by one who is an experienced teacher, as well as a gifted and ripe Greek scholar. Those about to take up the Anabasis for the first time will do a wise thing to supply themselves with "Crosby's Lexicon."

NEW ELEMENTARY GEOMETRY, with Practical Applications; A Shorter Course, on the Basis of the Larger Work. By Benjamin Greenleaf. A.M. Published by Robert S. Davis & Co., Boston, Mass.

This shorter treatise is intended for use in High Schools and Academies, where the time will not suffice for the study of the larger work. It contains those geometrical principles that are most important and essential for practical life, and also about twenty pages of practical applications. The method of treatment is the same as in the "Elements," by the same author. The well-known excellence of the "Elements" characterizes also this simpler work.

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The title page of "Underground" very fully sets forth the character of the work. Though a subscription book, it is yet tolerably well printed and illustrated. It certainly contains a great amount of interesting and instructive reading. Several of the chapters, however, seem to us repulsively sensational, both in style and matter.

The Atlantic Monthly for December comes to us full of instruction and entertainment. It opens with a clear and valuable sketch of Disraeli, by L. J. Jennings, throwing much light on the little understood character of the great statesman. John G. Whittier contributes the poem of John Underhill. Roman Neighborhood, by Henry James, Jr., is a pleasant chatty piece. The Norse Romance Gunner is continued. A Great Deed of Arms, by Francis Parkman, narrates an exciting event of the Canadian Iroquois war of the middle of the seventeenth century. The Externals of Washington, The Phantom Chapel, The Death of Dominie Quitman, and Israel Bethel Church, are interesting contributions. In the scientific columns is an able discussion of the spontaneous-generation controversy.

The Popular Science Monthly for November and December are at hand, and we quite despair of giving our readers an adequate idea in this short paragraph, of its wealth of scientific reading. Among the more important papers are Atkinson's Liberal Education of the Nineteenth Century, Psychology of the Senses, The Ringed Planet (illustrated), Mars, by the Latest Observations (illustrated), Health and Comfort in House-building, The Primary Concepts of Modern Physical Science, Radicalism, Conservatism and Transition of Institutions, The Requirement of Scientific Education, etc., etc.

The bound Volume No. 3, of the *Popular Science Monthly*, from May to October, 1873, has reached us very promptly with the completion of the volume. It makes a fine book to put on our shelves, and is peculiarly valuable for a teacher's library. Contributions from such men as Tyndall, J. Lawrence Smith, R. A. Proctor, Herbert Spencer, Crookes, Huxley, and others of like eminence, give it a value not easily measured. Of course the tone of the papers tends strongly towards evolutionism, and similar theories, which feature we deeply regret, except in so far as it is of value to know what the abler advocates of these theories believe. We advise teachers to procure and study this work.

Hearth and Home.—This unrivaled magazine for weekly home reading keeps up its full standard of excellence, which is a high one. There is an endless variety in its articles, furnishing pleasing reading for both old and young, wise and otherwise, and illustrations charming for all.

Littell's Living Age continues to furnish solid family reading of the choicest kind. In the number for November of this 8, weekly, we find valuable contributions on Petrarch, An Arctic Expedition in 1874, Nina, The Witch, Robert Southey, Narrative of Prince Charlie's Escape, Mr. Tennyson as a Botanist, Epitaphs, and the Religious Embarrassments of Germany.

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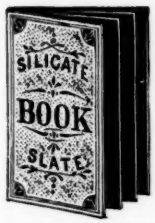

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